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TITLE: HELIUM: HOW DO WE PUT OFF THAT PROJECTED $5000/Mcf COST AS FAR INTO THE FUTURE AS POSSIBLE - OR SHOULDN'T WE EVEN TRY?

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HELIUM

How Do We Put Off That Projected $5000/Mcf Cost as Far Into The Future as Possible - Or Shouldn't We Even Try?

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line hitherto seen only in the solar spectrum. Shortly thereafter helium was found to be a component of the natural gases evolving from a spring in Wildbad in the Black Forest in Germany and this discovery immediately suggested that the gas ought to be an atmospheric component, an expectation which was confirmed shortly thereafter.

Helium also turned up somewhat unexpectedly in the course of the early investigations of radioactivity. By 1899 three different types of rays (α, β and γ) had been identified and of these it could be shown from e/m ratio measurements that if the positively charged alpha particle carried the same charge as a hydrogen ion, it had to possess twice the mass; if, on the other hand, it possessed twice the elementary charge, its mass would have to be almost identical with that of the helium atom. A few years later, first Ramsey, and then Rutherford and Royds more conclusively, demonstrated that alpha-particles upon capturing two electrons became helium atoms.

After these initial discoveries, physicists and chemists began the task of determining the properties of helium. For these purposes only small amounts were required and these were obtained primarily from thorium and uranium containing minerals. Even in 1908, when Kamerlingh Onnes first liquefied helium, the necessary gas supply had been carefully extracted from large quantities of monazite sands imported from India for this purpose.

Quite independently of these scientific studies, but at about the same time, the gas industry in the United States was getting underway. By the turn of the century, natural gas, which was already being used for illumination and space heating, had been discovered in 17 states and its production and local distribution had grown to a multi-million dollar business. Occasionally, however, certain gas fields were found to yield only non-combustible natural gases and it was soon shown that the components of these non-fuel gases were primarily nitrogen, with some carbon dioxide, occasionally some hydrogen sulfide and usually a relatively small percentage of hydrocarbons.

Then in 1905, H. P. Cady of the University of Kansas discovered that one non-fuel natural gas from a well in Dexter, Kansas contained, in addition to nitrogen and a small amount of methane, almost 2% helium. In the years since, helium concentrations in excess of 9% have been found in the gas streams from some U.S. fields and also in the gases evolving from a few mineral springs in Europe. Unfortunately, the total amount of recoverable helium from such extremely rich fields has proved to be disappointingly small. In southwest Kansas and in the Texas, Oklahoma panhandle area, however, the helium concentration in the fuel gas streams averages about 0.4% and the resource base is considerable. It has been estimated that most of this nation's remaining helium supply is concentrated in this area. Canada is also fortunate in possessing some helium rich natural gas fields but so far as is known, the helium content of most of the rest of the world's natural gases is substantially less than 0.1%.

The above account identifies all of the places, both terrestrially and extraterrestrially,* in which helium has been shown experimentally to exist. It remains of interest to ask and attempt to answer the question: how much helium exists in each category and what are the dynamics of the situation? Table I provides a tentative answer to the first question - at least for the terrestrial environment.

It turns out that helium is not one of the earth's more abundant elements, but, compared with any projected use, it has been argued by the Department of the Interior that the 700 Bcf estimated to be contained in this nation's remaining resources of natural gas should be regarded as an effectively "inexhaustible" resource. The difficulty with this view is that of DOI's 700 Bcf, half has not yet been discovered and most of the other half is rapidly disappearing as the nation's natural gas supplies are being consumed. Despite this, the DOI has consistently opposed the establishment of any effective helium conservation program on the basis that so much helium still exists that a federally supported conservation program is unwarranted! Other opponents of helium conservation have on occasion insisted that the entire concept of "conservation" is ridiculous -- we will never "run out" of helium they say, because it will always be "conserved" in the atmosphere! This is the first of many examples of the nonsense that abounds in the great helium conservation debate.

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*The presence of helium in stellar atmospheres, nebulae, etc., has since been confirmed spectroscopically; indeed, hydrogen and helium are the two most abundant elements in the universe.

TABLE I

THE TERRESTRIAL ABUNDANCE OF HELIUM

Category	Amount
Overall Terrestrial (atmosphere, hydrosphere, lithosphere)	5.0×10^{14} m^3
Atmospheric Helium (at 0.00054 vol %)	0.2×10^{14} m^3 5000 cubic miles 10^6 Bcf
U.S. Natural Gas Resource Base (estimated by the DOI)	2.0×10^{10} m^3 700 Bcf

I mentioned a moment ago that the dynamics of the terrestrial helium budget would be discussed. I had intended to discuss it. It is a fascinating subject; but if we get started on it, we'll never get to the main topic of this paper. Suffice it to say that the atmospheric helium budget is believed to be a steady-state situation, in which the loss to outer space from the top of the atmosphere is balanced by entry into the bottom of the atmosphere by helium production from radioactive decay in uranium and thorium containing rocks. The trouble is that the source and sink flux terms can be calculated quite accurately and they are not equal by about two orders of magnitude. Vigorous research is currently underway in several places to try to understand what is really going on!

Practical or potentially commercial applications of helium did not materialize until the beginning of World War I when it was realized that hydrogen-filled observation balloons being used by the Allies to observe enemy postions would be far less vulnerable to incendiary bullets if they could be filled with helium. An immediate survey was undertaken of sources of helium in the then far flung British Empire with the result that it appeared feasible to obtain the required amounts only from natural gas fields in Canada. The building of separation plants was quickly undertaken and then, when the United States declared war in 1917, scientists and engineers from the U.S. Bureau of Mines joined the large scale helium production effort. But despite all the urgency, helium production from both the Canadian and the U.S. plants got underway too late to affect the war's outcome. It <u>was</u> demonstrated, however, that helium could be extracted in large quantitites from natural gas at a cost of only a few cents per cubic foot, and the development of a commercial

helium industry became for the first time a real possibility. For a variety of reasons, however, the production of helium remained a government monopoly for the next 45 years. In consequence, applications of helium were restricted to military uses, in particular to the Navy's lighter-than-air aircraft program, an activity which grew very rapidly with this country's entry into World War II. It was not until the post World War II space program got underway that helium production really began to burgeon. Figure 1 from the Bureau of Mines details this history.

It was mentioned earlier that a natural gas industry was already well established in the United States by the turn of the century. It was, however, for about the next 30-40 years constrained in its service area to regions close to the well head. But with the development of long distance high pressure gas transmission in the mid-1930's, coupled with the conveniences and environmental advantages associated with the use of natural gas as a fuel, the use of natural gas after World War II literally "took off" and for years the increase in the production rate averaged about 7%/yr.

It was soon recognized by several groups of sentient and also deeply concerned individuals that along with this natural gas on its way to the nation's stoves and furnaces was going the nation's supplies of helium! Furthermore, the rate at which this helium was being lost was alarming. If one were to plot on this same Fig. 1 the volume of helium (commingled with natural gas) which was being lost to the atmosphere each year, the point for 1945 would be about 2800 MMcf; for 1950, about 4400 MMcf; about 6600 MMcf in 1955, over 15,000 MMcf in 1970, and so on. In comparison,

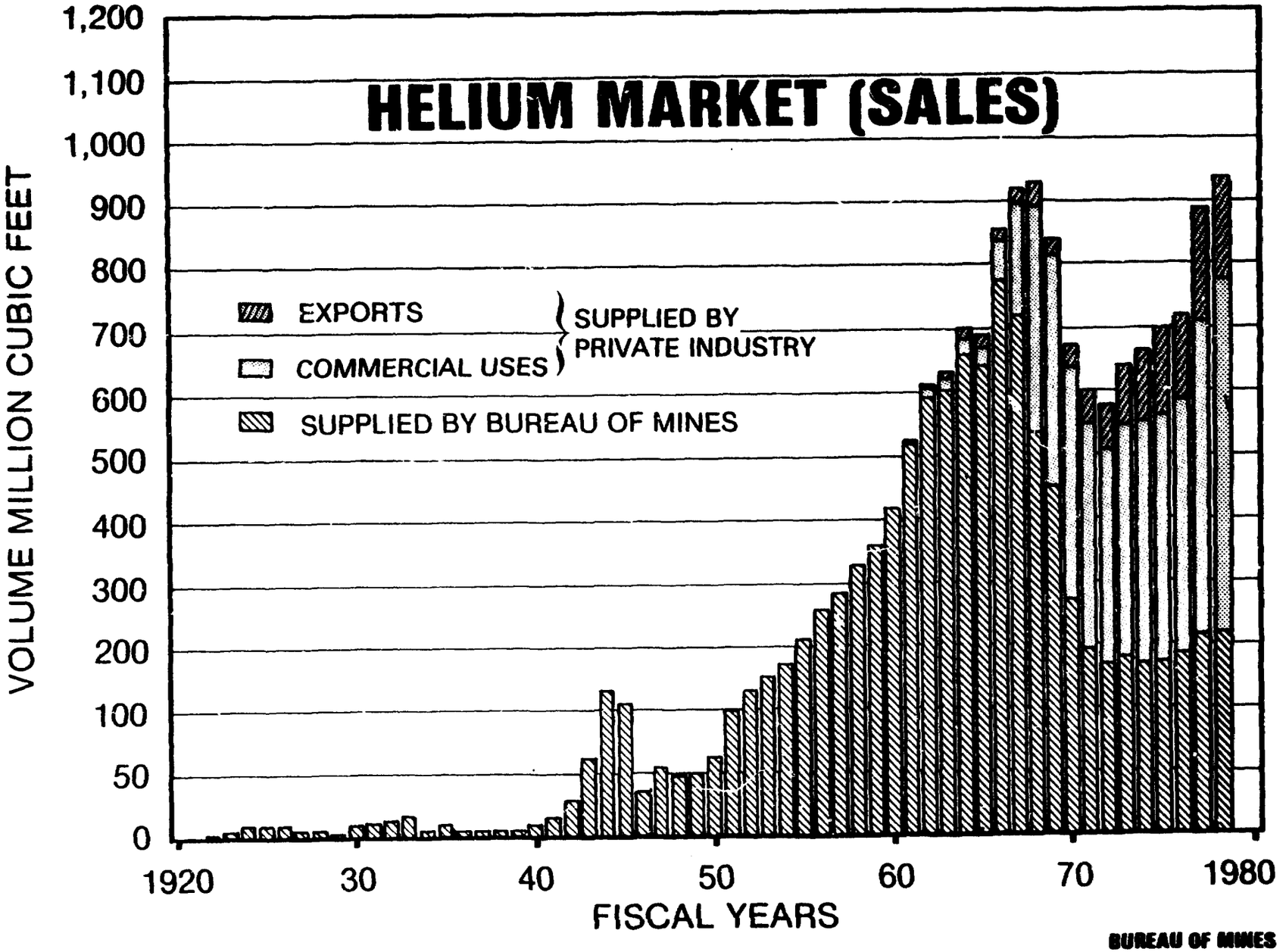

HELIUM MARKET (SALES)
VOLUME MILLION CUBIC FEET
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
50
0
EXPORTS
COMMERCIAL USES
SUPPLIED BY PRIVATE INDUSTRY
SUPPLIED BY BUREAU OF MINES
1920
30
40
50
60
70
1980
FISCAL YEARS
BUREAU OF MINES

Fig. 1.

the national demand for beneficial uses of helium was only about 1% of the total annual loss. In effect, the nation was being thoughtlessly relieved of one of its great treasures. One could perhaps, without too much exaggeration, call it the "heist of the century," although the perpetrators themselves were not even receiving any benefits from their actions.

By the mid-fifties, this concern had become widespread. One of the most significant events which helped finally to provoke federal action was a resolution introduced and passed almost exactly twenty-two years ago here in Madison at the Fifth International Conference on Low Temperature Physics and Chemistry. May I quote from the Proceedings of that Conference:

"Dr. S. C. Collins brought to the attention of the members of the conference the need for conserving helium gas. It was pointed out that there is a definite possibility that at the present rate of use of natural gas from wells containing helium in quantities sufficient for efficient separation of helium, our usable supply of gas-well helium will be exhausted in 20 years. A resolution written by Dr. Collins was presented to the conference by Dr. F. G. Brickwedde in his absence.

"A few days between the presentation of the resolution and the vote on it were allowed for discussion and study of it by the members of the conference. After this time the following resolution was approved for submission to the Office of the President of the United States. The members of the conference from the United States approved the following resolution unanimously (i.e., without any dissent) and the scientists from abroad concurred, likewise unanimously."

The resolution itself is reproduced in Fig. 2.

Simultaneously, as may also be seen from Fig. 1, it became apparent by the early 1950's that the Bureau of Mines' helium production facilities constructed during the war would be strained to the utmost to provide helium for rapidly growing federally sponsored projects such as the space and atomic energy programs, leaving no reserve capability for defense requirements. And since the United States was at that time just extricating itself from the Korean conflict, the Bureau of Mines became increasingly concerned about its ability to respond quickly to future emergency demands for helium for defense purposes.

The net result of the emergence of these two concerns for the nation's helium supply resulted in funding for a major expansion of the Bureau's helium production facilities and the beginning of some formal federal consideration of how to extract helium from the natural gas on its way to market and conserve it for future use. It then took another 7-8 years to develop a workable helium conservation program, and this was finally accomplished with the passage of the Helium Act Amendments of 1960. Unfortunately in the few years taken to get this program underway a grand total of, about 100 billion cubic feet of helium was lost to the atmosphere. Only a few decades earlier, this helium had seemed as secure as the gold in Fort Knox!

At any rate, in response to the passage of the Helium Act Amendments of 1960, five privately-owned conservation plants were in operation by 1963 to extract helium at an average annual helium production rate of about 3 Bcf from the helium-rich natural gas from the Hugoton Panhandle field near Amarillo, Texas. This was about half of what the Bureau of

RESOLUTION ON THE CONSERVATION OF HELIUM GAS

Whereas,

The ever rising rate of consumption attests the value of helium in technology and in scientific research. The future holds promise of important additional uses for the gas. In many of these applications there is no known substitute for helium.

The United States of America is blessed with a limited number of natural gas fields which yield gas containing an appreciable percentage of helium. No other known source of importance exists. The helium bearing gas from these American fields is flowing to market at a prodigious rate. Only a small fraction of the outgoing gas is currently being stripped of its helium. The remainder of the helium is irrevocably lost.

The helium recovery process developed by the Bureau of Mines and currently in use could, through multiplying existing plants, save a large fraction of the helium now going to waste without impairing the usefulness of the natural gas either for fuel or for synthesis operations. Pure helium in excess of current needs could be stored in government owned gas wells.

Be it therefore resolved that,

We, the delegates of the Fifth International Conference on Low Temperature Physics and Chemistry earnestly request the Government of the United States to seek at the earliest possible moment means of recovery of the helium now being wasted and means of conserving it for this and future generations.

From Proceedings of the Fifth International Conference on Low Temperature Physics & Chemistry, Univ. of Wisconsin, Madison, Wisc., August 26-31, 1957.

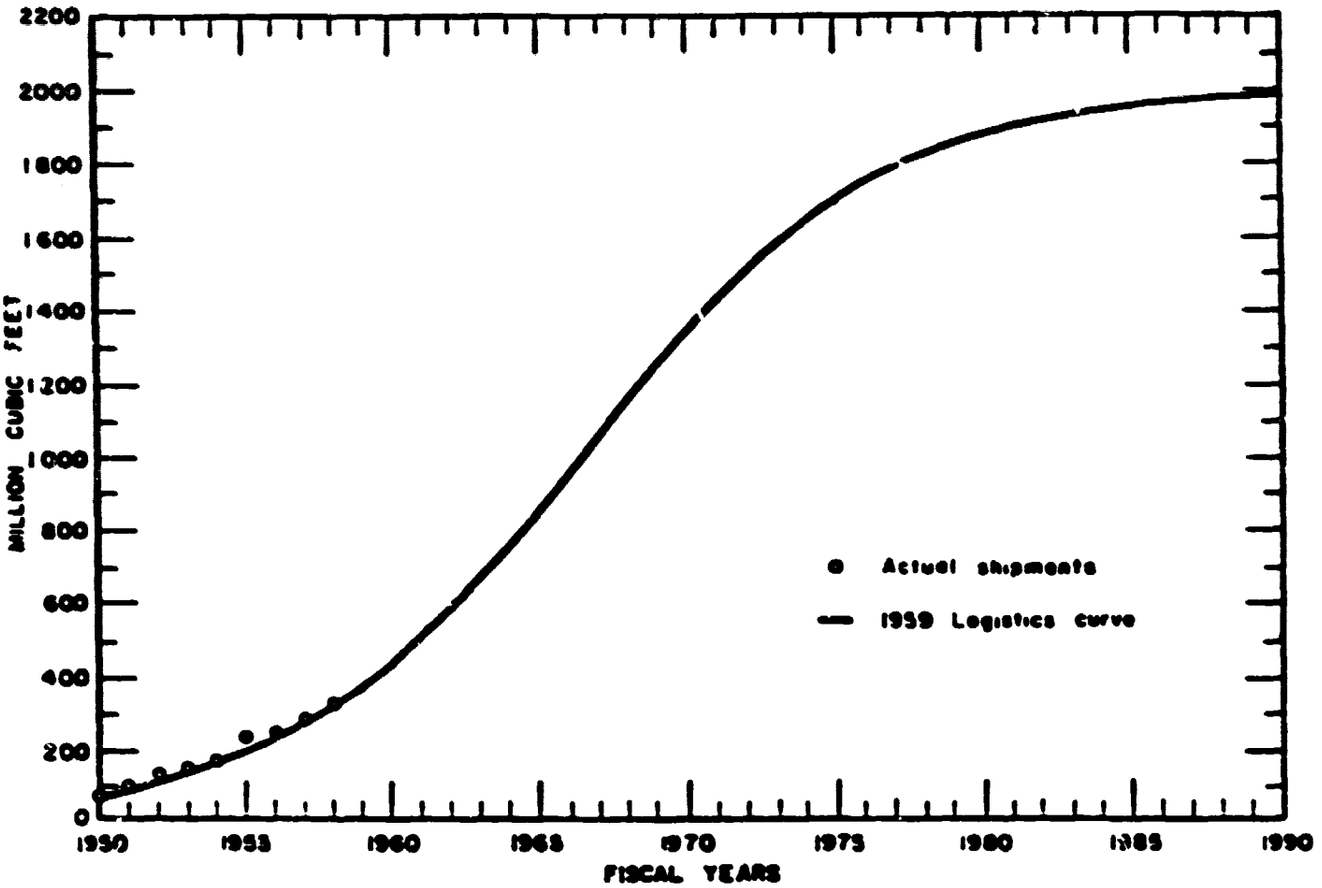
Fig. 2.

Mines had originally hoped to achieve but it was nevertheless a major step in the right direction, and the expectation was that by 1983 over 60 Bcf of helium would have been separated and stored for future use in the Cliffside gas field near Amarillo.

It is necessary at this point to say a few words about the method by which this conservation program was to be financed. To begin with, the estimated demand curve upon which the program was based is shown in Fig. 3. Practically all of the projected uses were expected to occur in federally-sponsored R&D programs such as space, atomic energy and defense. Under these conditions it was believed that future demand could be predicted with considerable accuracy and, given that information, the financing of the conservation program could be worked out. Since the federal government in effect held a monopoly on the production of helium and was also simultaneously its own sole customer, it could set the price of helium arbitrarily high, high enough in fact to "pay off" the cost of the program in about 22 years as illustrated in Fig. 4.

In retrospect it is hard to understand how one part of our government could propose such fiscal nonsense and another part swallow it. Clearly the Department of the Interior was simply being authorized to collect, from other components of the federal government, additional monies (over and above their helium production costs) to finance their proposed helium conservation program. These other federal agencies had to, in turn, request additional funds from the Congress to pay for their own increased helium costs!

The apparent nonsense of this financing procedure did not escape several members of both the Senate and the House during Committee



Estimated Total Helium Demand, FY 1950-1990 (1959 Logistics Curve)

Fig. 3.

THE PROGRAM CAN PAYOUT BY 1985
PAYOUT BASED ON GOVERNMENT OPERATION OF 5 EXISTING PLANTS AND PURCHASE OF HELIUM FROM UP TO 12 PLANTS BUILT AND OPERATED BY INDUSTRY

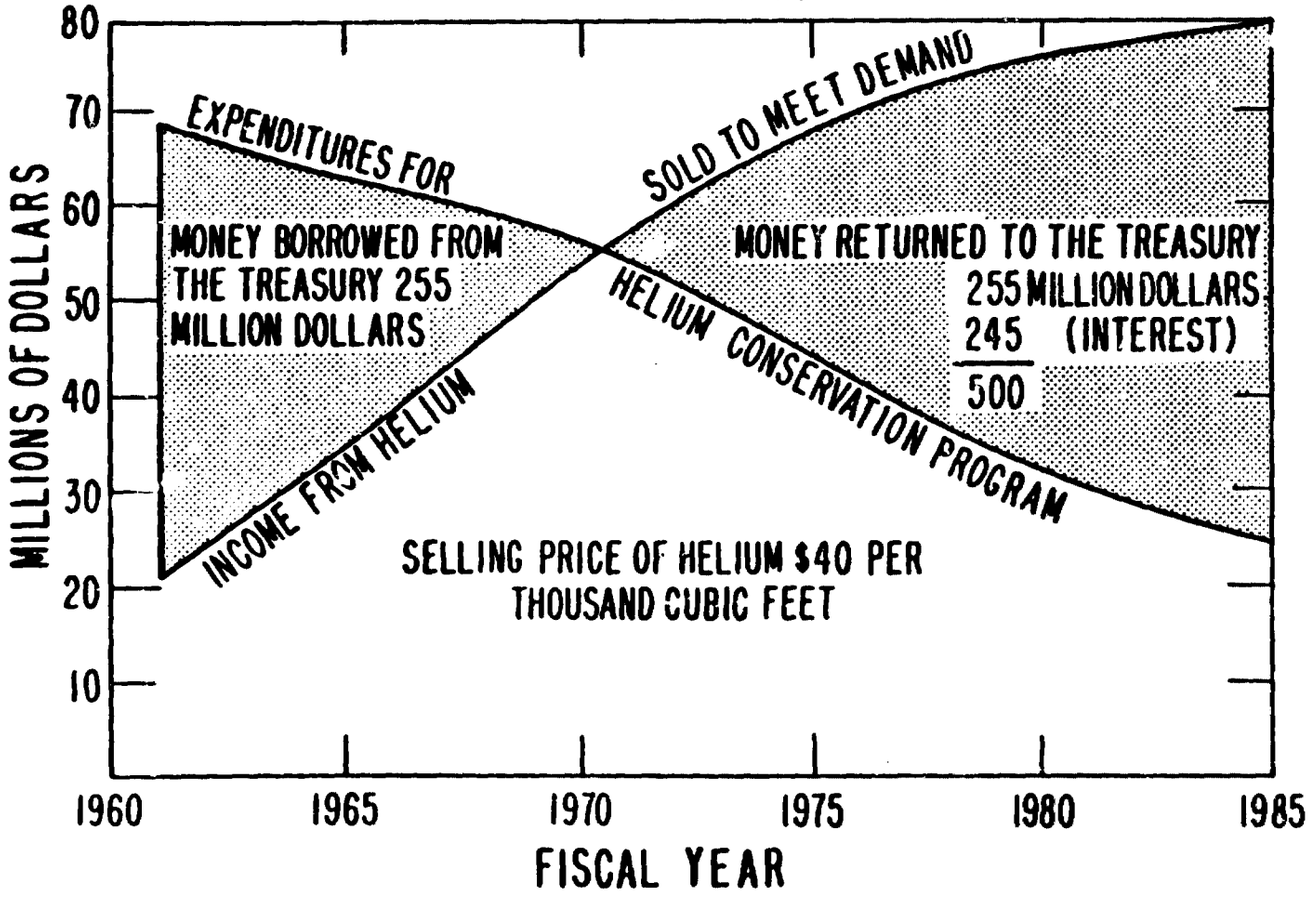


Fig. 4.

discussions and full Congressional debate. On August 31, 1960, for example, in a floor debate between Senator usche of Ohio and Senator Allott of Colorado the following exchange took place:

Mr. LAUSCHE. One final question. Except for the helium that would be sold to private industry,... it would be a bookkeeping operation because as a buyer, the Government would be using taxpayers' money to buy the helium, and then in selling, it would be selling to another Government agency, which would be using the taxpayers' money to pay the price.

And Mr. Allott admitted that that was indeed correct!

There was still another serious flaw in the legislation which was also repeatedly pointed out in both the Committee deliberations and on the floor of the Senate. This was related to the encouragement given in the bill to the creation of a private helium industry. Section 15 stated that:

> "It is the sense of the Congress that it is in the national interest to foster and encourage individual enterprise in the development and distribution of supplies of helium, and at the same time provide... a sustained supply of helium... for essential Government activities."

That serious problems would be created by the emergence of a private helium production industry was recognized during the course of the hearings even by the proponents of the legislation. For example, Mr. Elmer F. Bennett, Under Secretary, DOI, admitted during the June 1, 1960 hearing before the U.S. Senate Committee on Interior and Insular Affairs that:

..." the legislation assumes that the Government would be the principal, if not the only, primary source of helium to meet the requirements of Federal agencies and industry. If any part of the helium market should be supplied by direct sales from a private plant to consumers, the payout plan would be jeopardized ..."

Subsequently, Senator Anderson of New Mexico also queried the Under Secretary on this very point, suggesting that it was a very real possibility that the payout plan would be jeopardized since the privately produced helium was likely to cost the consumer substantially less than government produced helium. This critical issue was picked up once again later by Senator O'Mahoney of Wyoming who argued that: "The program, nevertheless, as Senator Anderson has amply pointed out, is so arranged that private owners may destroy the Government program by the sale of helium." In response, the DOI insisted that this was really only an imaginary problem since, "As of today, there is no commercial production."

When the helium conservation program began there was, in fact, one small privately-owned helium production plant under construction, by mid-1968 the number of private plants had grown to four and two more were under construction. The Federal market had by then been severely impacted, and revenues were correspondingly reduced. With the reduction in sales, the sum of sales revenue plus the annual Congressional borrowing authority made it impossible to fully reimburse the Helex contractors for the conservation helium purchased. Finally, to make matters even worse, the Treasury increased its interest rates by about 2½% and the ability of the helium conservation program to meet its

original fiscal commitments became hopeless. By the end of FY-69, the Helium Activity's unpaid bills totaled $18 million and the situation was getting worse with every passing day. In a predictable response, review committees were set up, studies were initiated and Congressional hearings were held. Strenuous but unsuccessful efforts to rescue the program were made, for example the Helium Research Center in Amarillo was abruptly closed and the Secretary of the Interior undertook to issue regulations forcing government contractors to buy Bureau of Mines helium at $35/Mcf (when it was available in the private market for $20/Mcf). But the Air Reduction Co. took the government to court on this issue and won its case.

The year 1969 was a watershed year for the program. Federal sales (and income) had plummeted and something obviously had to be done to "correct" the situation. The following events then occurred:

1. In January, a report on the Federal Conservation Program for Helium was prepared by K. F. Anderson, Special Assistant for the Assistant Secretary, DOI, and recommended either terminating the program or increasing the already arbitrarily high price of federal helium still further.
2. In its mania for ferreting our ways to eliminate "unnecessary" federal spending, the Bureau of the Budget selected the Helium Conservation Program as a likely candidate for extinction in FY-81. One cannot help but wryly note in passing that federal activities with weak political constituencies tend to be "hurt"

by budgetary hatchet-men much more frequently than those with a strong political base, regardless of the merits of the situation.

3. Extensive Congressional hearings were held in September 1969 to review the entire program in an effort to find a legislative solution to the problem.

4. In May 1970 the Department of the Interior, which was still dedicated to trying to figure out some way of rescuing the program, initiated negotiations with the four conservation contractors to reduce the contract prices. By September 1970, these negotiations were progressing so successfully that Interior decided to request $56.1 millions from Congress for FY-81 to permit continuation of the program at a reduced annual cost. During the rest of Calendar 1970, the record shows that Interior continued to try hard to save the program. This included, at the end of the year, an eleventh hour appeal to President Nixon by Acting Secretary Russell.

   At about this point, one of the conservation contractors, Northern Helex, apparently became convinced that the situation had gotten beyond redemption and filed a breach of contract suit against Interior on December 24, 1970 for the defendant's failure to pay large overdue amounts under the contract terms.

5. On January 4, 1971 OMB formally rejected, on behalf of the President, Secretary Russell's 11th hour appeal as follows:

"The decision to terminate the helium conservation program contracts should be upheld; the program is no longer justified.

"The circumstances which indicate the need for termination are as follows:

-- Helium sales (both Bureau of Mines sales and total U.S. sales) have dropped in every year since 1966. Total sales are 60% of what was anticipated when the program was initiated in 1960.

-- Present stockpile will take care of estimated essential Government requirements (which the Helium Act Amendments were aimed at providing) through the Oear 2000. At current rates of consumption, the present stockpile will satisfy total demand for almost 40 years.

-- Technological improvements since 1960 have reduced the cost of extracting helium from leaner gases.

-- The above three points constitute "other circumstances of similar nature" within the meaning of the termination provisions in the helium contracts.

-- Since the Helium Act Amendments of 1960 were passed, there has been a discovery of a new helium-rich field with estimated recoverable helium of from 5 to 15 billion cubic feet.

In light of the discussion above and the analysis and discussion which have taken place on this program, we believe that all of the points in the appeal have been met and that the decision to terminate successfully withstands the appeal.

The budget decision assumes that the termination action will be a Secretarial determination, with announcement in early January, that circumstances exist which satisfy the termination provisions of the contracts."

6. Despite still further appeals by the Secretary of the Interior, on January 26, 1971, Under Secretary Russell was finally obliged to inform the Helex contractors that their contracts were terminated effective March 28, 1971.

It is now necessary to examine the termination clauses of the helium conservation contracts referred to above in the CMB memo to understand the additional troubles that ensued. Section 12.1 of the Helium Act Amendments of 1960 reads:

"12.1 The United States may terminate this contract at any time if any of the following circumstances or any other circumstance of similar nature should occur which, in the opinion of the Secretary of the Interior, would make the continued operation of Seller's plant and the continued purchase of helium-gas mixture extracted therein unnecessary to accomplish the purposes of the Act or any amendments thereto: (1) the discovery of large new natural helium resources, or (2) a substantial diminution in helium requirements."

In view of what has just been reported, it must be obvious that this contract termination did not result from a determination by the Secretary of the Interior that the helium conservation program satisfied the criteria for termination specified in the legislation. The Secretary of the Interior was, in fact, quite cognizant of this technicality and on the day before the contracts were terminated, the Under Secretary is reported to have reminded those officials preparing the termination papers that

"The cancellations have to be handled in such a manner that (the decision to cancel) is the decision of the Secretary of the Interior and not the decision of the President or OMB or anyone else."

In the Report of Trial Judge Spector to the U.S. Court of Claims in the case of NORTHERN HELEX COMPANY v. THE UNITED STATES in 1974 it was pointed out in excruciating detail that circumstances most assuredly did not exist which satisfied the termination provisions of the contracts. For example, here are some quotes from the report of Judge Spector:

a) "Suffice it to say that the Under Secretary of the Interior, aided by a highly competent and experienced staff, did, in fact, put his own mind to the problem and reached his own decision. But he was then obliged to render quite another decision."

b) "a substantial diminution in helium requirements" had not, in the Secretary's opinion, occurred

c) "no large new natural helium resources" had been discovered, and

d) "no other circumstance of a similar nature had occurred.

"It is therefore not surprising that the U.S. Court of Claim's found in favor of the plaintiff and, although the case is still not settled, the arguments now are not whether or not the government is at fault, but rather how much the damages should be.

We are running ahead of our story, however, for what happened next is an interesting illustration of how different companies react to the same problem. The other three Helex contractors, upon receipt of the termination notices continued delivering crude helium until the set termination date of March 28, 1971 except that on March 27th they obtained an injunction restraining the termination of their contracts because the Secretary of the Interior had not filed the necessary environmental impact statement mandated by the National Environmental Protection Act (NEPA).

It took Interior 20 months to prepare the EIS but then, seven months thereafter, the U.S. District Court in Kansas declared it inadequate! Interior appealed that decision and finally on October 19, 1973, the Tenth Circuit Court reversed the District Court decision and ordered the injunction dissolved. The Federal purchase program for the conservation of helium finally ceased on November 12, 1973. Since that time, over 3 Bcf per year of helium passing through these plants has either been vented to the atmosphere or allowed to remain in the natural gas on its way to market. Some privately-owned helium has been stored in the Cliffside Field during this period and particularly in the last few

years, less and less is being wasted. But it is still true today that between 1 and 2 Bcf per year that could be salvaged continues to be lost to the atmosphere.

After the Court of Claims ruled in favor of Northern Helex, the three other conservation contractors were encouraged to file suits against the United States for breach of contract. Their claims total $375 million dollars. Although these lawsuits have not yet reached a settlement, there remains the possibility that the federal government will still have to pay many hundreds of millions of dollars to extricate itself from this quagmire and we will in the process have forfeited billions of cubic feet of helium to the atmosphere as well.

But that is not all of the legal story by any means. If over $400 million dollars may be required to settle the breach of contract lawsuits, claims against the government for another $600 million or even more are still in litigation. Unfortunately it is impossible in the time available to go into these other aspects in detail.

Obviously the story of our nation's abortive attempt to conserve helium should be the subject of a book rather than a brief talk and perhaps someday, when all the lawsuits do get settled, one will be written. For the present, however, the best that can be done is to sum up where we're at in this drama at the present time.

In the years following the contract terminations, numerous bills and resolutions were introduced in the Congress designed to revive the helium conservation program, but they have all either languished in Committee or passed into oblivion by never having been acted upon by both Houses of

the Congress. Last February, Representative John Dingell of Michigan introduced H.R. 2620, titled the Helium Energy Act of 1979, which is a somewhat new approach to the helium conservation problem. Three hearings have been held on this bill. As usual, because it involves some expenditure of federal funds, the Administration: (Interior, Energy and the OMB) are all opposed to the bill, but there seems, for the first time, to be a modest ground swell of opinion pressing for action and the Committee staff responsible for drafting the legislation is quite optimistic that this time something will really happen.

I think that there is no point in discussing here the details of this new legislation. Indeed the effort would be wasted because, as a result of information developed during the course of the hearings, parts of the bill are being rewritten during this current Congressional recess. A revised bill will be reintroduced in September in the hope that it will be passed by the House before the end of the first session and then the Senate will have the entire Second Session of the 96th Congress to consider it.

Let me, nevertheless, sketch the main ideas which have been proposed in HR 2620.

- Firstly, two long overdue corrective actions will be taken. These are:
  - a) write off the helium debt which is now over half a billion dollars
  - b) get the federal government out of the helium supply business

- Secondly, attention is focused on extracting and conserving practically all of the helium resident in natural gas, i.e., in the bill "helium bearing natural gas" is defined as all natural gas for which the helium content is 0.01% or more. As a result of the hearings, however, I believe that the revised legislation will increase the lower limit by perhaps an order of magnitude.

It became quite apparent to the Committee staff during the hearings that the extraction of helium from 0.01% natural gas streams with a helium content as low as 0.01% would be prohibitively expensive.

- Thirdly, a National Helium Reserve will be established which will consist of other new storage reservoirs in addition to the Cliffside field.
- Fourthly, all persons transporting or selling helium bearing natural gas in commerce will be required to extract and either store or use beneficially the contained helium.
- Fifthly, the cost of the program will be passed on to the consumers of the natural gas.
- Finally, title to the stored helium shall reside with the federal government but the original seller shall receive a negotiable "right of repurchase."

I myself have mixed feelings about this legislation. In many respects it can be characterized as an "overkill" response to what is a thoroughly deplorable and reprehensible situation. To the extent that the bill remains extreme in its revised version, its chances of passage are probably seriously impaired. Indeed, even if major concessions and

modifications are made in the bill, the forces arrayed against the establishment of any kind of a helium conservation program are very powerful and very determined. They are also in my opinion very misinformed and very misguided.

On the other hand, for those of us who would like to see an effective helium conservation program established, time is running out. I suspect that if this bill does not pass, it will be a long, long time before any member of the Congress will be willing to expend the time and effort to draft new legislation. On balance therefore, I expect to work for the passage of this bill and I hope that many of you will study the revised version when it becomes available and will be persuaded to support it also. If we can get a half way workable program going, it should be possible to fix up any remaining inadequacies as we go along.

I have two more brief comments to make in conclusion. The first is to alert you to what I consider to be the specious and misleading arguments of the "opposition." These arguments can be categorized as follows:

1. The Arguments of the Economists and the Government Planners:
   a) The scientists will find a substitute for helium.
   b) The technologists will find a substitute for the technologies that require helium.
   c) It makes no economic sense to allocate today's dollars to stockpile scarce resources.

d) We still have so much helium, there is no need to revive a helium conservation program. We can afford to wait and see whether any of these new technologies needing helium will ever become viable.

e) Projected demand estimates for DOE's new technologies are very uncertain anyway.

f) The DOE itself doesn't need any helium!!!

g) Even the DOE experts have agreed that a new conservation program is unnecessary.

2. The Arguments of the Gas Companies:

a) Helium conservation is fine but don't saddle us with the implementing the program.

b) Company A is a special case and ought to get an exemption from participating in the program: our gas flow rates are too low, our reserves are too small, our pressures are too low, the composition of our gas is unsuited for helium extraction, our collection system is too diffuse, etc., etc.

c) The legislation is unconstitutional.

3. The Arguments of the Helex Companies:

a) There was nothing wrong with the old law. All that's necessary is to reinstitute it.

My last comment is simply that if all else fails, and no action to conserve helium is taken, strenuous efforts ought to be taken to "lock up" the helium in the Cliffside field for as far into the future as

possible. The same thing goes for whatever nondepleting helium containing gas fields are still under the control of the federal government. It must be recognized that by the time the Hugoton-Panhandle field is depleted (1990-2000), there will be tremendous pressures brought to bear on the government to sell the stockpiled helium. In so doing the government could even make quite a tidy profit. But to do so would be almost criminal! Instead, private industry must be assured that the national helium policy is such that stockpiled helium will be released only after the cost of supplying the market from extraction plants working on ever more dilute streams of natural gas becomes comparable with atmospheric extraction costs. In the interim, we should also take advantage of foreign sources of helium. Unfortunately, this will add to our future balance of payments problems.